

# International Cooperation in the EU Transport Research: Experiences and Barriers

Monika Bąk

**Abstract** Transport research is crucial for the development of transport policy and solving current and future problems of transport market functioning and its impact on social and economic life as well as on the environment. Transport is global and at present it seems to be more and more important to develop a wider approach in transport research and to support international cooperation in this field. In this paper the relation between transport policy objectives and the EU strategy for international cooperation in the research and innovation (R & I) field has been analyzed. Additionally barriers of international cooperation in transport research are identified at the level of legal, institutional, financial, technological, and social and behavioral aspects. Some solutions to overcome these obstacles are also proposed.

**Keywords** International cooperation • Transport research • Stakeholders

## Introduction

Transport sector meets numerous challenges such as minimalizing environmental threats, reducing risk of accidents, improving quality of service for passenger and goods, etc. As a global sector, transport is also diversified between countries in the context of technological development, legal background, and institutional framework. Innovations are needed in order to reduce barriers for further transport development. They can be developed and implemented in a specific geographical context but also at the international level. The second approach is especially important because it provides wider applications and ensures effectiveness to a significant degree. The objective of this article is to present the relation between transport policy objectives and the strategy of international cooperation in transport research at the EU level, to identify challenges and barriers of the research, and to provide some recommendations.

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## Objectives of the EU Policy of International Cooperation in Research vs. Transport Policy Priorities

As it is stated in the EC communication on enhancing and focusing EU international cooperation of September 2012 [15], international cooperation in research and innovation contributes to the broader policies of the Union, as reflected in the Europe 2020 strategy, in supporting the following objectives:

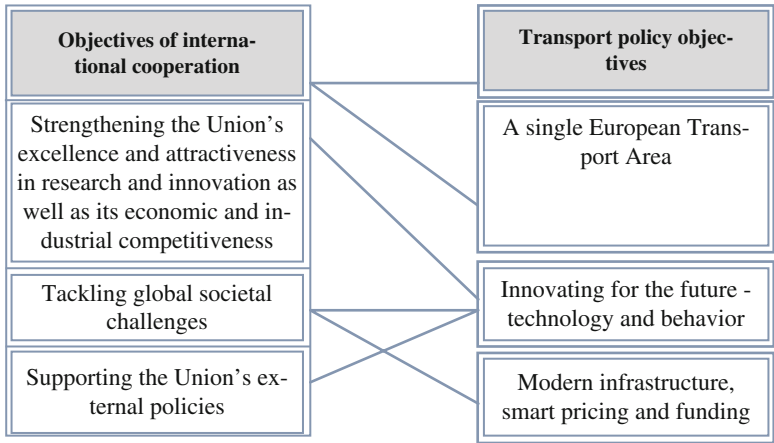
- Strengthening the Union's excellence and attractiveness in research and innovation and its economic and industrial competitiveness
- Tackling global societal challenges, such as food and energy security and climate change
- Supporting the Union's external policies

The question is if these objectives are in line with the priorities of the EU transport policy and can be helpful in realizing this policy. According to the White Paper on Transport of 2011 [19], a vision for a competitive and sustainable transport system requires achieving several goals:

- Growing transport and supporting mobility while reaching the 60 % emission reduction target
- An efficient core network for multimodal intercity travel and transport
- A global level-playing field for long-distance travel and intercontinental freight
- Clean urban transport and commuting

It is also mentioned that “implementing the above vision requires an efficient framework for transport users and operators, an early deployment of new technologies and the development of adequate infrastructure” which can be achieved through realizing strategic objectives of creating a single European transport area, innovating for the future—technology and behavior—and ensuring modern infrastructure and smart funding. One of the horizontal strategic instruments is also focusing on external dimension of the EU transport policy. Since transport is fundamentally international, most actions in the road map are linked to challenges related to the development of transport beyond the EU borders. External dimension as a horizontal issue is inevitable and includes all transport modes and almost all spheres of market functioning. It can be concluded then that the realization of transport objectives is closely linked to general EU international cooperation strategy.

Moreover the need to incorporate EU transport priorities into the subthemes and EU research policy should be stressed. As it is presented in Fig. 1, strengthening the Union's excellence and attractiveness in research and innovation as well as its economic and industrial competitiveness would be achieved through creating win-win situations and cooperating on the basis of mutual benefit. Instruments consist of enhancing R & D cooperation with the EU-associated countries and other countries worldwide but also of improving integration which helps to create wider market. In transport sector the impact of this policy can be perceived in all aspects of priorities' realization. A single European transport area could be further developed with a



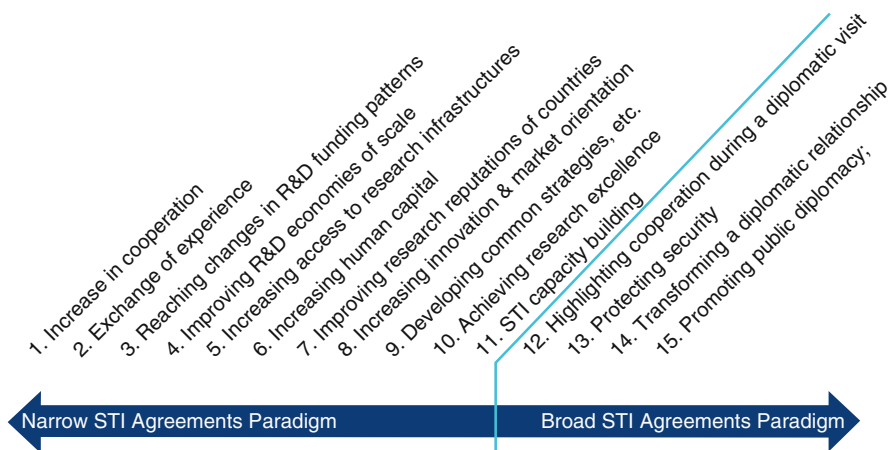
**Fig. 1** Relation between EU high-level objectives of international cooperation and transport policy objectives [own elaboration]

closer integration of the research within and also outside the EU. New possibilities will emerge in the field of innovating for the future transport systems in both technology and behavior and creating modern infrastructure, smart pricing, and funding. If one assumes further enlargements or looks at the international dimension of transport modes, it appears to be clear that it is impossible to complete the Single European Sky, the European maritime transport space, or liberalized road freight market without cooperation with third countries (including research cooperation).

Tackling global societal challenges requires developing and deploying effective and innovative solutions in both technology and behavior. In general innovating for the future is very closely connected with research policy and international cooperation aiming at transferability of best practices or new concepts' elaboration. Additionally, new and modern solutions in transport infrastructure can be developed through international cooperation as well as smart pricing, especially for infrastructure, and new funding schemes are global challenge for the research. The achievements of modern infrastructure and smart funding goals can be accelerated by the cooperation in research regarding practical solutions, their implementation potential and barriers, etc.

Supporting the Union's external policies is in line with the formation of innovations in transport. It could be achieved through enhancing R & D cooperation with two broad stakeholder groups—EU-associated and neighboring countries and other countries worldwide.

Advantages of international cooperation in research can be perceived from the perspective of international science, technology, and innovation agreements which are strongly supported by the European Commission [see, e.g. 2, 5, 13]. According to the European Commission study, potential advantages can be grouped into a narrow and a broad science and technology and innovation agreement paradigm [5]. The first one is related only to quality, scope, and critical mass in STI (science, technology, and innovation) by linking resources and knowledge with resources and knowledge in other coun-



**Fig. 2** Reasons for signing science and technology agreements grouped in two paradigms [5]

tries. The second paradigm also includes nonscience policy objectives. In the broad paradigm, signing a bilateral STI agreement becomes a means to reach policy ends outside the realm of science, technology, and innovation. The figure below presents both paradigms and the respective reasons for signing a bilateral STI agreement (Fig. 2).

From the perspective of transport sector, this impact is also significant and can be perceived from both the policymakers' and researchers' point of view. Stronger multilateral relations in research would improve mutual trust and policy networks and partnership in general which is especially important in such an international sector as transport. Additionally international cooperation in transport research improves implementation and enforcement processes and ensures better insides into best and worst practices in domestic transport systems. Researchers can expect such benefits as creating new knowledge and focusing on innovations through better quality research team. This results in innovative solutions in transport technology and transport system development. International cooperation provides better access to expertise, skills, and research areas as well as efficient dissemination of research results and best practice examples. That seems to be an important factor in the area of smart pricing and funding in transport. Within international cooperation complex, scientific and technical problems, for example, regarding trans-European networks or a single European transport area, can be tackled in a faster and better way. Additionally, there is an increased access to funding for research.

## The European Union Initiatives in Promoting and Supporting International Cooperation in Transport Research

At the EU level, some initiatives aiming at improving international cooperation in research are developed and supported. The major instrument of the EU research policy is Framework Programmes for Research and Technological Development,

realized from 1984 (the First Framework Programme) until now—Eighth Framework Programme named Horizon 2020.

The origins of the Framework Programme are in European efforts to close a perceived “technology gap,” first with the USA and later with Japan, and to promote European competitiveness, especially in energy and information technology [2]. The changing nature of global competition and the progress of the European project toward closer union mean that the role of the Framework Programme has evolved. Initially, it was an effort to support European industrial competitiveness in a limited number of sectors by networking together and strengthening European technology development effort. It has evolved to become a larger and more powerful instrument for funding and coordinating scientific research as well as more industry-orientated technology efforts across Europe.

The selection of results from EU-funded projects that have shown great strides in innovation, including transport-oriented project, is presented in the brochure published by the European Commission [7]. But still it should be remembered that the changing global landscape (e.g., new players emerged in science, technology, and innovation researches like China) both creates opportunities and increases the need for strengthening internationalization of the research [11].

In 2000, since the launch of the European Research Area (ERA), Framework Programmes have become a component in a wider EU research and innovation policy. European Research Area ([21], see also [9]) is the instrument—area open to the world based on the internal market, in which researchers, scientific knowledge, and technology circulate freely. The objective of ERA is to strengthen the EU scientific and technological bases, including optimal transnational competition and cooperation through jointly addressing grand challenges. Additionally, the ERA external link consists of research activities, programmes, and policies in Europe which involve a transnational perspective, including cross-border cooperation.

At the EU level, some initiatives for dissemination information on international research are also developed. CORDIS should be mentioned here as the European Commission’s primary public repository and portal to disseminate information on all EU-funded research projects and their results in the broadest sense ([http://cordis.europa.eu/home\\_en.html](http://cordis.europa.eu/home_en.html) [20]). Alternative information portal is at the website of the Directorate-General for Research and Innovation. Its mission is to develop and implement the European research and innovation policy with a view to achieving the goals of Europe 2020 and the Innovation Union [24].

As it was mentioned earlier, the most important instruments of the EU research policy are Framework Programmes. The specific objectives of the programs vary between funding periods. In FP6 and FP7, focus was still on technological research; in Horizon 2020 the focus is on innovation, delivering economic growth faster, and delivering solutions to end users that are often governmental agencies. Horizon 2020 is open to the participation of researchers from across the world. As more research and innovation is performed in international partner countries, it is crucial that Europe is able to access the best researchers and research centers worldwide. Not only does this provide sources of new ideas and expertise, but it is also important to ensure that European researchers are able to collaborate worldwide with the best in the field.

In 2014 the communication from the European Commission titled “Research and innovation as sources of renewed growth” [16] was published (“research and innovation”—R & I term is now commonly used at the EU level instead of former “research and development”, R & D). In this communication additional investment is confirmed from the Union budget for R & I, but it is also clearly said that these funds must complement (not substitute for) investments by member states from both public and private sources. Though there is no special attention put on the international cooperation, it is clear that objectives stated here cannot be achieved without such initiatives.

Focusing on transport sector, research programs should be also mentioned. The previous one—Seventh Framework Programme—included the specific program “cooperation” and its thematic area “transport” (including aeronautics) with the objectives of the development of integrated, safer, “greener,” and “smarter” pan-European transport systems for the benefit of all citizens and climate policy, respecting the environment and natural resources, and securing and further developing the competitiveness attained by the European industries in the global market [10].

It should be added that Framework Programmes are also targeted to third countries. In the seventh FP, Russia, China, and Japan and to a lesser extent Latin America, India, and industrialized countries were included.

In Horizon 2020 the so-called Transport Challenge is allocated a budget of 6339 million EUR [6] for the period 2014–2020 and will contribute to four key objectives, each supported by specific activities [25]:

- A resource-efficient transport that respects the environment by making aircraft, vehicles, and vessels cleaner and quieter to minimize transport system’s impact on the climate and environment; by developing smart equipment, infrastructures, and services; and by improving transport and mobility in urban areas.
- A better mobility, less congestion, and more safety and security with a substantial reduction of traffic congestion and with a substantial improvement in the mobility of people and freight, by developing new concepts of freight transport and logistics and by reducing accident rates, fatalities, and casualties and improving security.
- A global leadership for the European transport industry by reinforcing the competitiveness and performance of European transport manufacturing industries and related services including logistic processes and retaining areas of European leadership (e.g. aeronautics).
- A socioeconomic and behavioral research and forward-looking activities for policy making. The aim is to support improved policy making which is necessary to promote innovation and meet the challenges raised by transport and the societal needs related to it.

In 2012 communication from the European Commission [14] on developing a European transport-technology strategy, it is confirmed that global environmental challenges need a coordinated global response, so clearly a need for international cooperation is formulated. Also, the commission postulates that transport research and innovation should be more focused. Therefore in the Work Programme 2014–2015 in the area of “Smart, green and integrated transport”, the following activities are addressed by three calls for proposals [17]:

- Mobility for growth
- Green vehicles
- Small business and fast track innovation for transport

As indicated in the Specific Programme, the “activities will be organized in such a way as to allow for an integrated and mode-specific approach as appropriate.” Therefore, the contents of the “Mobility for Growth” call have been organized as follows:

- Areas addressing mode-specific challenges (technical and socioeconomic): aviation, rail, road, and waterborne
- Areas addressing transport integration-specific challenges (technical and socioeconomic): urban, logistics, intelligent transport systems, and infrastructure
- Areas addressing cross-cutting issues: socioeconomic and behavioral research and forward-looking activities for policymaking

In transport sector there exist also some initiatives of the EU promoting international cooperation in research. Transport Research and Innovation Portal (TRIP), formerly known as the Transport Research Knowledge Centre (TRKC), should be mentioned. Here in-depth information about projects, thematic reports, and policy brochures are available [26].

EC research and innovation portal is also available for transport [23]. Policy directions for research are published there, and evaluations of the results of the research projects are available in the unified form of the EC publications:

- Communicating EU transport research Directorate-General for Research and Innovation [4]
- More efficient—less polluting. How 20 years of EU research cleaned up the internal combustion engine and made it drive better [8]
- Aeronautics and Air Transport Research. Project Synopses [1]
- Towards European Integrated Ocean Observation. Expert Group on Marine Research Infrastructures [12]

Finally, also international cooperation with other countries in the area of transport should be mentioned [22]. Successful specific cooperation actions were developed with Canada, China, Latin America, India, Japan, Russia, South Africa, Ukraine, and the USA in the period 2007–2011. Coordinated calls included external link with China and Russia in 2010.

## Barriers of the International Transport Research

Advantages of international cooperation in the research will be reduced if existing and emerging barriers are not taken into consideration in planning strategies and implementation processes. Table 1 presents the proposal for classification of barriers of international cooperation in the research, their importance in transport research, as well as possible solutions to overcome them. Obstacles can be grouped in five areas representing legal, institutional, financial, technological, and social conditions.

**Table 1** Classification of barriers of international cooperation in transport research

Type of barrier	Impact on the cooperation in research <sup>a</sup>		Importance for cooperation in transport research <sup>b</sup>	Possible solutions to overcome barriers
	Within the EU	With non-EU partners		
Legal/lack or inadequate legal regulations	–	v	++	Removing remaining legal constraint cooperation New concepts of cooperation Harmonization of rules Enforcement issues Statistical evidence and reporting
Institutional/ not well-adjusted institutional framework	v	v	+++	Involvement of different stakeholders, e.g., SME Cooperation in research between private and public sector Institutional framework Minimizing risks of conflicts and inefficiencies Ensuring coordination between different levels
Financial/ lack of or insufficient resources	v	v	+++	Additional financing sources Alternative financing of research Cooperation with industry Efficient pricing and financing New models of financing Dissemination of best practices and transferability of solutions
Technological/ insufficient technological support	–	v	+	New platforms for cooperation Implementation issues Best practices dissemination and transferability
Social and behavioral/lack of support from public opinion	v	v	+	Publicity for R & D cooperation Information campaigns Raising awareness and social acceptance for new solutions Ensuring nondiscrimination of some user groups Involving wide groups of stakeholders

<sup>a</sup>v barriers influence negatively cooperation on this level; – barriers do not influence negatively cooperation on this level

<sup>b</sup>+++ barriers are very important for cooperation in transport research; ++ barriers are important for cooperation in transport research; + barriers are not very important for cooperation in transport research



Legal barriers still play important role in the range of international cooperation between partners from differentiated countries, especially from the EU states and developing countries. Enforcement issues also differ between some countries which can be a constraint for the research. Removing existing legal obstacles and harmonization of rules are the solutions to be implemented in the cooperation in research, including transport field. Institutional framework is important mainly in order to involve private sector into research and minimizing risks of inefficiencies. Insufficient financial resources influence negatively the progress in the international cooperation in transport research. Developing new and alternative models of financing as well as dissemination of best practices in financing and transferability of these solutions can improve the situation. In the case of technology in transport area, barriers do not strongly influence international cooperation. But some improvements would be useful, for example, creation of new platforms for cooperation, especially with non-EU partners. Public support is needed for efficient international cooperation in research. Then raising awareness, involving wide groups of stakeholders and publicity, can help in achieving social acceptance.

In the report published by the EC including results of the study on “European Added Value of EU Science, Technology and Innovation actions and EU-Member State Partnership in international cooperation,” three major barriers of international cooperation are identified both by EU and third-country researchers and stakeholders [13]:

- Lack of financial means to support co-funding mutual research undertakings
- Administrative burdens of organizing cooperation
- Lack of knowledge and information about other country’s strengths and complementarities

It is also interesting that political barriers or geographical distance is not treated as a problem anymore. Still some strong administrative barriers of the international cooperation in research between the EU and third countries exist [3]. These barriers include the so-called EC bureaucratic barriers which involve obstacles related to constant changes of the rules and procedures, duration of project evaluation, payment delays, etc. The next group of barriers consists of institutional barriers at national level (e.g., lack of the country’s lobbying skills at the level of EU administration, low scientific image of a country, etc.).

Barriers of international cooperation in research are not easy to overcome. But many efforts have been already done at the European Union and other country levels (see [13]). The most important aspect is elaborating and implementing research finding schemes at the EU level. They allowed to reduce barriers of cooperation through supporting networking, facilitating organization of the research projects, and fostering harmonization at legal and institutional levels.

## **Conclusions: Prioritization of the Research**

When analyzing priorities and regarding the emphasis put on international cooperation objectives of the research policy of the European Union on the one hand and transport research strategies on the other, one should expect a very intensive

progress in the realization of international projects and improving their positive effects. This is the case only to some extent. The EU instruments have been developed intensively, but many barriers still hinder the implementation of international research cooperation. Then it is a need of comprehensive and continuous analysis of future challenges for research and policy which should result from the state of the art and a review of existing gaps. Then the research needs can be translated into researchable questions. The final step should be a research prioritization, but this can be done only when criteria for prioritization are set.

Research on international cooperation can be prioritized mainly when taking into consideration its relevance to EU transport objectives and EU research policy. Moreover, a challenging task is to include additional research prioritization criteria, especially feasibility of research and potential impact. Additionally, the following criteria should also be taken into account:

- Potential for multiplicative effects
- Desirability of new research
- Additional to the EU funding opportunities

Prioritization of future research can be additionally considered more technically on two principal levels: strategic and operational. On strategic level the main challenges refer to:

- Necessity to apply specific approaches depending on the maturity of the cooperation, the country's scientific capacity
- Seeking for additional funding components (industry, SME, partner country, etc.)
- Guaranteeing visibility for the public and decision makers, especially facing concerns related to practicality, timing, cost, and impact of jointly produced innovative transport technologies, solutions, and legislative proposals

At operational level, concerning project and program management, the topics relate to:

- Timeliness and quality of information (solution: keep working on dissemination of practical information about EU's large-scale funding opportunities)
- Too many objectives (solution: many activities, few objectives, clear focus)
- Lack of explanation of obstacles and problematic areas (solution: project requirements to stress problems, not only justify the funding)
- Lack of directions for future research (solution: project requirements to provide advice on future work)

In addition to the above-discussed general objectives, one can also include the set of criteria mentioned in the Regulation of the European Parliament and of the Council, establishing Horizon 2020 ([18], see also [9]). As it is stated there, areas for engaging with third countries should be identified in a systematic and coherent manner on the basis of an analysis of the Union vis-à-vis the rest of the world in line with the following set of criteria:

- Research and innovation capacity, including investment, output, human resources, and infrastructure—that means research which would obviously benefit financially from being carried out jointly, after taking account of the additional costs of international collaboration. Research which contributes to the cohesion of the common market and which promotes the unification of European science and technology
- Risks of and opportunities for access to existing, new, or emerging markets and their impact on the EU competitiveness
- Contribution to the Union's international commitments, as reflected in the Millennium Development Goals, the post-2015 development framework, Rio+20, G20 and the international objectives of sectoral policies—that means research which would achieve significant results in the whole of the community for problems on the international scale, owing to the complementary nature of national efforts
- The legal and administrative frameworks in place, among the international partners—that means research which leads when necessary also to the establishment of uniform laws and standards and where appropriate the member states, to engage in cooperation, also including lessons learned from previous cooperation

Transport sector is global and a need of international cooperation in transport research is obvious. Instruments supporting funding for mutual research have to be further developed to make them increasingly smart and efficient. Existing barriers of the cooperation, especially when they include third countries of the EU, should be reduced. Research on international cooperation should contribute to the wider objectives on transport integration based on three pillars: economic efficiency, social fairness, and environmental sustainability. From the perspective of European countries, the problems resulting from discrepancies between EU and non-EU countries are still unresolved. Then one recognizes the need to enhance R & D cooperation which finally should result in improving integration of the EU but also integration of transport sector in a wider meaning, as well as in the environmental protection, higher quality of transport services, and safety of transport sector.

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